PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants	:	Francis W. Daly Jr.
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For	:	WEATHER INCIDENT PREDICTION

Examiner	:	John Barlow
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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUPPLEMENTAL APPEAL BRIEF

Commissioner for Patents:

This brief is in furtherance of the Notice of Appeal, filed in this case on October 17, 2005, and the Order Returning Undocketed Appeal to Examiner (hereinafter the "Order") issued by the Board of Patent Appeals and Interferences (hereinafter the "Board") on October 10, 2007. This Supplemental Appeal Brief is filed herewith in accordance with item 3 of the Order, at page 6. The fees required under Section 1.17(c), and any required request for extension of time for filing this brief and fees therefore, are dealt with in the accompanying transmittal letter.

I. REAL PARTY IN INTEREST

The real party in interest is Honeywell International, Inc., 101 Columbia Road, PO Box 2245, Morristown, NJ 01962, the assignee of record of the entire interest of the above-captioned application.

II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences are known to either appellant or the appellant's legal representative which will directly affect or be directly affected by or have a bearing of the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1 and 3-38 are pending and stand rejected. Claim 2 is canceled.

Claims 1 and 3-38 are appealed.

IV. STATUS OF AMENDMENTS

The status of the amendment filed subsequent to final rejection is that the amendment has been entered. Appellant's after final amendment was filed on August 17, 2005. Entry of the after final amendment was acknowledged in the Advisory Action mailed on September 2, 2005.

The Appellant has incorporated said amendment in the Appendix of Claims attached hereto.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In the invention as presently claimed, apparatus and methods for predicting the future state of a weather condition relative to an aircraft are disclosed. The claims of the present invention are to methods and electronic circuits implementing the methods that predict future weather relative to the threat posed to the safety of flight. Preferably, a warning is generated as a function of a forecast intensity of a storm cell as compared with an intended phase of flight at predicted intersection of the aircraft with the storm cell. Figs. 7 and 9 illustrate embodiments of the method and apparatus, respectively. (*See*, *e.g.*, Summary of the Invention at page 12, lines 13-29; see, also, Specification at page 18, lines 19-28.)

The method and apparatus determine two or more gradations of threat and generate different warning signals as a function of such gradations of threat. (*See*, *e.g.*, Specification at page 18, line 29 to page 19, line 31.)

The method and apparatus determines gradations of threat as a function of storm cell intensity and phase of flight. (*See*, *e.g.*, replacement paragraph beginning at page 12, line 22 as set forth in Preliminary Amendment filed on April 13, 2004, at page 2, and new paragraph

beginning at page 19, line 16 as set forth in Preliminary Amendment filed on April 13, 2004, at pages 2-4.)

The following shows exemplary independent Claims 1, 13, 20, 22, and 29 with reference numerals illustrated in the Figures noted in brackets and identification of disclosure in the Specification noted in parenthesis. The identification of page and line numbers in the Specification, and identification of reference numerals used in the Figures, are exemplary only and are not intended to limit the claims.

Claim 1: A method for predicting the future state of a weather condition relative to an aircraft, the method comprising:

accessing a first weather radar image [200] generated relative to the aircraft (Specification at page 16, lines 18-24);

accessing a second weather radar image [210] generated after said first weather radar image [200] and having a similar relationship to the aircraft as said first weather radar image [200] (Specification at page 16, lines 24-29);

mapping said first weather radar image [200] onto said second weather radar image [210] (Specification at page 16, lines 18-29);

comparing said first and second weather radar images [200, 210] (Specification at page 16, lines 18-24);

forecasting information describing a weather condition represented by said first and second weather radar images [200, 210] (Specification at page 17, lines 2-12);

retrieving a phase of flight of the aircraft (Specification at page 18, lines 19-21); and

generating a warning [206, 208] as a function of comparing said forecast information describing a weather condition and said phase of flight (Specification at page 18, line 29 to page 19, line 31).

Claim 13: A method for predicting the future position and intensity of a weather condition relative to an aircraft using a weather radar resident on-board the aircraft, the method comprising:

recording a first weather radar image [200] generated by an onboard weather radar [112] (Specification at page 16, lines 26-29);

recording a second weather radar image [210] generated after said first weather radar image [200] (Specification at page 16, lines 26-29);

spatially and temporally mapping said first weather radar image [200] onto said second weather radar image [210] (Specification at page 16, lines 24-25);

predicting a future track (Specification at page 15, lines 24-26) of a weather condition as a function of said first and second weather radar images [200, 210] (Specification at page 17, lines 2-12);

displaying said predicted future track [204] of said weather condition (Specification at page 17, lines 13-17);

retrieving a phase of flight of the aircraft (Specification at page 18, lines 19-21); and

determining a potential threat to the safety of flight and a severity of said potential threat as a function of comparing said weather condition and said phase of flight (Specification at page 18, line 29 to page 19, line 31).

Claim 20: A method for using an electronic circuit [100] to predict the future position and intensity of a weather condition relative to an aircraft using a weather radar resident on-board the aircraft, the method comprising:

recording a first weather radar image [200] generated by an onboard weather radar [112] (Specification at page 16, lines 26-29);

recording a second weather radar image [210] generated at a time after said first weather radar image [200] (Specification at page 16, lines 26-29);

accessing said first and second recorded weather radar images [200, 210];

with the electronic circuit [100], referencing said first and second recorded weather radar images [200, 210] to a common physical location (Specification at page 16, lines 24-25);

with the electronic circuit [100], analyzing said first and second weather radar images [200, 210] (Specification at page 17, lines 2-12);

with the electronic circuit [100], predicting a future track [204] of one or more weather cells (Specification at page 15, lines 24-26; and Specification at page 17, lines 13-15) as a function of said analyzing said first and second weather radar images [200, 210];

with the electronic circuit [100], generating a signal representative of said predicted future track [204] of said one or more weather cells (Specification at page 17, lines 22-32);

displaying said predicted future track [204] of one or more of said weather cells (Specification at page 17, lines 13-17);

with the electronic circuit [100], accessing an intended flight path of the aircraft (Specification at page 18, lines 19-21);

with the electronic circuit [100], accessing a phase of flight of the aircraft (Specification at page 18, lines 19-21);

with the electronic circuit [100], predicting a coincidence of said intended flight path and said weather condition (Specification at page 18, lines 29-33); and

with the electronic circuit [100], determining a potential threat to the safety of flight as a function of comparing said coincidence of said intended flight path, said phase of flight, and said weather condition (Specification at page 18, lines 29-33).

Claim 22: An electronic circuit [100] for use with a weather radar system to predict the future state of a weather condition relative to an aircraft, the electronic circuit [100] comprising:

a memory [308] for storing a plurality of machine instructions (Specification at page 20, lines 24-26);

a processor [306] coupled to receive a signal representative of a phase of flight of the aircraft and further coupled to said memory [308] for accessing said plurality of machine instructions, said processor [306] accessing a phase of flight of the aircraft (Specification at page 18, lines 19-21) and executing said plurality of machine instructions to implement a plurality of functions, said functions comprising:

a) accessing a first weather radar image [200] generated relative to the aircraft (Specification at page 16, lines 18-24);

b) accessing a second weather radar image [210] generated after said first weather radar image [200] and having a similar relationship to the aircraft as said first weather radar image [200] (Specification at page 16, lines 24-29);

c) referencing said first weather radar image [200] to said second weather radar image [210] (Specification at page 16, lines 19-29);

d) comparing said first and second weather radar images [200, 210] (Specification at page 16, lines 19-29);

d) forecasting as a function of said first and second weather radar images [200, 210] information describing a weather condition represented by said first and second weather radar images (Specification at page 17, lines 2-12); and

e) generating a warning [206, 208] as a function of comparing said phase of flight and said information describing a weather condition represented by

said first and second weather radar images (Specification at page 18, line 29 to page 19, line 31).

Claim 29: An electronic circuit [300] for coupling to a weather radar system [304] on-board an aircraft to display weather information and forecast weather data relative to a phase of flight of the aircraft, the processor comprising:

a weather radar processor [306] adapted to receive first and second weather radar return signals from a receiver portion of a weather radar system resident [304] on-board an aircraft and convert said first and second weather radar return signals into first and second weather radar image signals representative of weather information relative to said aircraft contained in said weather radar return signals (Specification at page 16, lines 19-29);

a memory [308] coupled to said processor [36] and adapted to receive and store said first and second weather radar image signals (Specification at page 20, lines 16-24);

a weather incident prediction function [106] operated by said processor [306] and coupled to said memory [308] to receive first and second different ones of said stored weather radar image signals, said weather incident prediction function [106] adapted to forecast future weather information relative to said aircraft as a function of said first and second stored weather radar image signals, and generate a signal representative of said future weather information (Specification at page 20, lines 23-26); and

a threat prediction function [106] operated by said processor and coupled to receive a signal representative of a phase of flight of the aircraft and said signal representative of said future weather information (Specification at page 21, lines 18-23), said threat prediction function adapted to compare said future weather

information and said phase of flight and predict a threat to the safety of flight as a function of said comparison (Specification at page 18, line 29 to page 19, line 31).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1 and 3-37 are rejected under 35 U.S.C. § 103(a) as being obvious over US Patent 5,974,360 to Otsuka, et al., in view of US Patent 5,615,118 to Frank, and further in view of US Patent 5,077,558 to Kuntman.

VII. ARGUMENT

1) Rejection of Claims 1, 13, 20, 22, and 29 under 35 U.S.C. § 103(a)

Claims 1 and 2-37 stand rejected under 35 U.S.C. § 103(a) as being obvious over US Patent 5,974,360 to Otsuka (hereinafter Otsuka), et al., in view of US Patent 5,615,118 to Frank (hereinafter Frank), and further in view of US Patent 5,077,558 to Kuntman (hereinafter Kuntman).

In the invention as presently recited in Claims 1, 13, 20, 22, and 29, embodiments predict the future state of a weather condition relative to the threat posed to the safety of flight. Thus, embodiments of the present invention thus grade the severity of threats based upon the intensity of the weather, such as a storm cell, in combination with the phase of flight during coincidence with the storm cell.

Otsuka teaches equipment for weather image prediction. See, *e.g.*, Abstract.

Frank teaches an onboard aircraft flight optimization system that includes an onboard performance management computer, a control display unit, an infrared probe, a temperature probe, a weather radar, an inertial navigation system, and comparing apparatus. See, *e.g.*, Abstract. The apparatus of Frank compares a remote wind signal with a local wind signal, and compares a remote temperature signal with a local temperature signal so as to determine a position remote from the aircraft where the remote wind signal is less than the local wind signal so that an altitude can be achieved that has less head wind and is therefore more economically efficient. See, *e.g.*, Abstract.

Kuntman teaches an airborne wind shear detection radar having a transmitter for transmitting successive radar beams into airspace in front of an aircraft, and a receiver for receiving reflected signals. The radar of Kuntman analyzes the received reflected signals in the frequency domain to determine if a wind shear condition exists in the airspace in front of the aircraft. See *e.g.*, Abstract.

As to independent Claims 1, 13, 20, 22 and 29, the Office Action contends that Otsuka discloses accessing a second weather radar image generated after a first weather radar image and having a similar relationship as a first weather radar image, spatially and temporally mapping the first weather radar image onto said second weather radar image; comparing the first and second weather radar images; and forecasting information describing a weather condition represented by the first and second weather radar images, citing column 1, lines 35-43 and Figs. 11, 12, and 13.

The Office Action further contends that Otsuka further indicates that the method can be used in fields such as airplane operation and control, citing column 1, lines 53-62.

The Office Action admits that Otsuka does not specifically disclose a method wherein weather radar images are generated by a weather radar resident on-board an aircraft.

The Office Action further contends, however, that Frank discloses a method wherein weather radar images are generated by a weather radar resident on board an aircraft, citing column 4, lines 5-21 and column 7, lines 12-22. According to the Office Action, the method of Frank involves airplane operation and control by providing pilots with tactical information, including information about the severity of threats, such that the pilot may divert or take other corrective action, citing column 5, lines 19-23 and column 12, lines 15-33.

Accordingly, the Office Action further contends that it would have been obvious to one of ordinary skill in the art at the time of invention to modify Otsuka in the manner of Frank in order to provide a pilot with a highly accurate forecast of a weather image so that the pilot can better choose appropriate action based on the forecast.

The Office Action further contends Frank further discloses an onboard flight path optimization system with an onboard control display unit that includes lights, and keys for displaying data and inserting commands related to different phases of flight (modes), citing column 8, lines 38-59.

The Office Action admits that neither reference specifically teaches generating a warning reflecting a threat to safety as a function of a flight path and a phase of flight.

Rather, the Office Action contends that Kuntman discloses an airborne wind shear detection weather radar, citing the Title, Figs. 1 and 2, and column 1, line 59 to column 2, line 18, and teaches that an aircraft which traverses a micro burst along a path will experience an increased headwind at the forward edge and an increased tailwind at the trailing edge which can result in a considerable loss of altitude at critical phases of flight. The Office Action further contends that, in the cited passages, Kuntman incorporates wind shear detection as it relates to differing phases of flight and further discloses the use of an alert related to wind shear probability detection regarding severity of a threat, citing column 4, lines 27-30.

Accordingly, the Office Action contends that it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate into the combination of Otsuka and Frank (which the Office Action contends is concerned with an enhanced onboard weather radar for use in an onboard aircraft flight path optimization system) with the ability to generate alerts for wind shear detection as they relate to critical phases of flight with respect to the position of an aircraft along a flight path, since taking phases of flight into consideration with respect to the position of an aircraft and to the position of turbulence along a flight path allows a pilot the flexibility to take greater caution during a higher probability of threat to safety, while eliminating the need to change a course when a threat to safety is at a minimum.

Appellant respectfully traverse and have disagreed with the contentions of the Office Action for at least the following reasons.

Appellant first contends that Kuntman fails to remedy the deficiencies of the Otsuka and Frank references. As noted above, and as the Examiner has admitted, Otsuka and Frank both fail to disclose or suggest (1) receiving a phase of flight of the aircraft, and (2) generating a warning as a function of comparing said forecast information describing a weather condition and said phase of flight, as recited in Claim 1. Rather, the Examiner appears to rely upon Kuntman to allegedly disclose these further limitations.

With respect to Claim 13, Appellant further contends that Kuntman fails to remedy the deficiencies of the Otsuka and Frank references with respect to the recited retrieving a phase of flight of the aircraft and the recited determining a potential threat to the safety of flight and a severity of said potential threat as a function of comparing said weather condition and said phase of flight. With respect to Claim 20, Appellant further contends that Kuntman fails to remedy the deficiencies of the Otsuka and Frank references with respect to the recited accessing an intended

flight path of the aircraft, the recited accessing a phase of flight of the aircraft, and the recited determining a potential threat to the safety of flight as a function of comparing said coincidence of said intended flight path, said phase of flight, and said weather condition. With respect to Claim 22, Appellant further contends that Kuntman fails to remedy the deficiencies of the Otsuka and Frank references with respect to the recited said processor accessing a phase of flight of the aircraft and the recited generating a warning as a function of comparing said phase of flight and said information describing a weather condition represented by said first and second weather radar images. With respect to Claim 29, Appellant further contends that Kuntman fails to remedy the deficiencies of the Otsuka and Frank references with respect to the recited threat prediction function operated by said processor and coupled to receive a signal representative of a phase of flight of the aircraft and the recited said threat prediction function adapted to compare said future weather information and said phase of flight and predict a threat to the safety of flight as a function of said comparison.

Kuntman teaches, at most, an airborne wind shear detection radar built into an existing weather radar with turbulence detection capability. (Column 2, lines 7-12.) Kuntman teaches that wind shear "can cause considerable loss of altitude at critical phases of flight." (Column 2, lines 5-6.) Kuntman also teaches that "wind shear detection can be incorporated as a <u>mode of operation of the weather radar</u> and therefore could be activated during the landing and takeoff phases of flight." (Column 2, lines 12-15.) The above quotations are set forth in Kuntman as follows:

> Figure. 1 illustrates wind characteristics of a wind shear condition associated with a microburst 10, wherein a down draft exists near the center 12 of the micro burst 10 and the wind horizontally spreads out near a forward edge 14 and a trailing edge 16 of the microburst 10. As a result, <u>an aircraft 18 which traverses the microburst 10 along a path 20 will experience an increased head wind when it first contacts the microburst 10 at the forward edge 14</u>. As the aircraft 18 nears the center 12 of the microburst 10 it experiences a strong down draft and a shift from head wind to tail wind. As the aircraft 18 nears the trailing edge 16 of the microburst 10, it experiences an increased tail wind. This change from head wind to tail wind with a strong down draft is the characteristics of wind shear. It can cause considerable loss of altitude at critical phases of flight.
>
> Figure 2 illustrates a block diagram of a wind shear detection weather radar in accordance with a preferred embodiment of the present invention wherein wind shear detection capabilities are incorporated into an <u>existing</u> weather radar with turbulence detection capability. <u>Wind shear detection can be incorporated as a mode of operation of the weather radar and therefore could be activated during</u>

> <u>the landing and takeoff phases of flight. During the cruise climb and approach phases of flight the radar could be operated in any of its normal modes currently available</u>. (Column 1, line 59 to Column 2, line 18; emphasis added.)

Appellant contends that the Examiner is mistaken in interpreting the teachings of Kuntman. Appellant contends that Kuntman does not teach any "ability to generate alerts for wind shear detection as they relate to critical phases of flight with respect to the position of an aircraft along a flight path," as alleged by the Examiner.

The Examiner is not correct in asserting that Kuntman teaches an "ability to generate alerts for wind shear detection as they relate to critical phases of flight." Rather, referring to Kuntman at Column 1, line 59 to Column 2, line 18 (reproduced above), it is obvious that Kuntman only teaches that "wind shear detection <u>can be incorporated as a mode of operation of the weather radar and therefore could be activated during the landing and takeoff phases of flight</u>." However, Kuntman goes on to teach that "during the cruise, climb and approach phases of flight the radar could be operated in any of its <u>normal</u> modes currently available." Thus, Kuntman teaches <u>only</u> that wind shear detection can be <u>turned on</u> during critical phases of flight, and turned off during other phases of flight.

Kuntman's ability to "activate" a wind shear detection device during critical phases of flight, when coupled with an ability to deactivate the detection device during non-critical phases of flight, <u>cannot</u> possibly disclose or suggest generating a warning as a function of forecast information describing a weather condition and the phase of flight. Rather, Kuntman teaches <u>only</u> wind shear detection that operates when it is <u>activated</u>, and does not operate when it is not activated. Thus, Kuntman teaches <u>only</u> generating a wind shear warning <u>as a function of whether the wind shear detection is activated or not activated</u>. Kuntman does <u>not</u> disclose or suggest generating a wind shear warning <u>as a function of phase of flight</u> of the aircraft.

Kuntman's activating wind shear detection during critical phases of flight and de-activating it during non-critical phases is not anything like generating a weather warning <u>as a function of the phase of flight</u>, as recited in Claim 1. Similarly, Kuntman fails to disclose the above-recited features of Claim 13 (the recited retrieving a phase of flight of the aircraft and the recited determining a potential threat to the safety of flight and a severity of said potential threat as a function of comparing said weather condition and said phase of flight), Claim 20 (the recited accessing an intended flight path of the aircraft, the recited accessing a phase of flight of the

aircraft, and the recited determining a potential threat to the safety of flight as a function of comparing said coincidence of said intended flight path, said phase of flight, and said weather condition), Claim 22 (the recited said processor accessing a phase of flight of the aircraft and the recited generating a warning as a function of comparing said phase of flight and said information describing a weather condition represented by said first and second weather radar images), or Claim 29 (the recited threat prediction function operated by said processor and coupled to receive a signal representative of a phase of flight of the aircraft and the recited said threat prediction function adapted to compare said future weather information and said phase of flight and predict a threat to the safety of flight as a function of said comparison).

Furthermore, having wind shear detection active during critical phases of flight and deactivating it during non-critical phases cannot suggest comparing weather condition forecast information and said phase of flight.

In summary of this point, Kuntman's teaching that a wind shear detection device "could be activated" during critical phases of flight and could be de-activated during other phases of flight <u>cannot</u> possibly disclose or suggest generating a warning <u>as a function of the phase of flight</u>.

Furthermore, Kuntman's teaching that a wind shear detection device "could be activated" <u>during</u> critical phases of flight <u>cannot</u> possibly disclose or suggest generating a warning as a function of <u>comparing</u> weather condition forecast information and the phase of flight.

The Examiner alleges that it would be obvious to combine Kuntman's teaching of the ability to generate alerts for wind shear detection as they relate to critical phases of flight, with respect to the position of an aircraft along a flight path with the teachings of Otsuka and Frank, to arrive at embodiments of the present invention since "taking phases of flight into consideration with respect to the position of an aircraft and to the position of turbulence along a flight path, allows a pilot the flexibility to take greater caution during a higher probability of threat to safety, while eliminating the need to change a course when a threat to safety is at a minimum."

In response to the above arguments, the Examiner stated at page 9 of the Final Office Action dated June 17, 2005, that "Kuntman discloses that wind shear when detected leads to an alert provided by the detection device. Kuntman also discloses that this is important for critical phases of flight, yet not important enough for non-critical phases of flight that the wind shear

detection mode is not even activated." The Examiner therefore apparently believes that since an alert is generated only when wind shear is detected and only when the device is in wind shear detection mode, and since the device is only in detection mode during critical phases of flight, the Examiner apparently believes that "generating a warning as a function of the phase of flight" is disclosed in the Kuntman reference.

Merely reading the above counterargument shows that the Examiner finds undisclosed inferences and then finds that the combination of the invention was made obvious by stringing together a combination of the undisclosed inferences. MPEP § SP2136.02 clearly indicates that the "REFERENCE MUST ITSELF CONTAIN THE SUBJECT MATTER RELIED ON IN THE REJECTION" (printed in bold font in the MPEP). To infer such a teaching, the Examiner must improperly assume or infer other facts not actually disclosed in Kuntman.

Furthermore, in response to the Examiner's counterargument, Appellant points out again that electing to activate a process (the Kuntman wind shear detection) during one phase of flight (the Kuntman critical phase) and electing to de-activate that process during another phase of flight (non-critical) appears to merely teach that a process can be active during *one* phase of flight and non-active during *another* phase of flight.

In other words, Kuntman's teaching of generating a warning when the process is activated is merely that: generating a warning when the process is activated. As taught by Kuntman, the warning is not generated when the process is not activated. Therefore, Kuntman teaches, at most, generating a warning as a function of whether the process is activated. Kuntman *does not* teach "generating a warning as a function of the phase of flight," as the Examiner asserts, only as a function of turning on the equipment.

Appellant reiterates that "generating a warning as a function of the phase of flight," as recited in Claim 1, for example, is clearly inventive over the recited combination of art. Therefore, the Examiner must be using unsubstantiated inferences to allege unsupported disclosure to arrive at the instant invention.

Furthermore, the Examiner does not show any teaching in any of Otsuka, Frank and Kuntman that discloses or suggests "generating a warning as a function of comparing said forecast information describing a weather condition and said phase of flight," as recited in Claim 1, for example.

Rather, in the Advisory Action dated September 2, 2005, the Examiner merely states that "even if the reference did not compare A with B, as long a it compared A AND B, WITH anything else, the Examiner could still rely on the reference." However, the Examiner has misconstrued the claim language by suggesting that "comparing said forecast information describing a weather condition and said phase of flight," as recited in Claim 1, could mean anything except comparing the "information" with the "phase of flight" since these are the only two subjects supplied by the claim to be operated on by the "comparing" function.

Furthermore, regarding the Examiner's statement that the reference could be relied upon if it compared A AND B, WITH anything else, the Examiner does not point out any reference that actually does compare the "information" and the "phase of flight" with anything else.

Also, the Examiner does not address the fact that dependent claim 7 clearly requires "comparing said intensity of said weather condition **with** said intended phase of flight at said coincidence."

2) Kuntman is not a proper reference under 35 U.S.C. § 103

Kuntman teaches at most that, "wind shear detection can be incorporated as a mode of operation of the weather radar and therefore could be activated during the landing and takeoff phases of flight." (Column 2, lines 12-15.)

Thus, Kuntman teaches away from generating a warning as a function of forecast information describing a weather condition and said phase of flight, as recited in claim 1. Rather, Kuntman teaches disabling the weather radar during the landing and take off phases of flight, as shown by a full reading of the text of Kuntman, as follows:

> FIG. 2 illustrates a block diagram of a wind shear detection weather radar in accordance with a preferred embodiment of the present invention wherein wind shear detection capabilities are incorporated into an existing weather radar with turbulence detection capability. Wind shear detection can be incorporated as a mode of operation of the weather radar and therefore could be activated during the landing and takeoff phases of flight. During the cruise, climb and approach phases of flight the radar could be operated in any of its normal modes currently available. (Column 2, lines 7-17, emphasis added.)

Thus, Kuntman teaches (1) wind shear detection capabilities are incorporated into an existing weather radar with turbulence detection capability; (2) wind shear detection could be activated during the landing and takeoff phases of flight; and (3) during the cruise, climb, and

approach phases of flight, the radar could be operated in any of its normal modes currently available. Furthermore, wind shear detection is a different operation of the radar from weather detection. (See, *e.g.*, Column 2, line 30 to Column 4, line 26.)

In accordance with *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 U.S.P.Q. 2d 1385, (2007), the secondary factors of a proper non-obviousness test under *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 148 U.S.P.Q. 459 (1966) must be considered to properly establish a *prima facie* case for an obviousness rejection. Here, the above-described teaching away of Kuntman renders the proposed combination of Otsuka in view of Frank, in further view of Kuntman, improper. Accordingly, a *prima facie* case establishing an obviousness rejection by Otsuka in view of Frank, in further view of Kuntman has not been made. Thus, Claims 1, 13, 20, 22, or 29 are not obvious under the proposed combination and the rejection should be withdrawn.

3) The Proposed Modification Cannot Render The Prior Art Unsatisfactory For Its Intended Purpose

As taught by Kuntman, weather detection and wind shear detection are <u>different</u> and **<u>mutually exclusive</u>** operations of the weather radar. MPEP § 2143.01, section V, entitled "THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE," states that "if the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Goredon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984)." Furthermore, MPEP § 2143.01, section VI, entitled "THE PROPOSED MODIFICATIONS CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE," states that "if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959)." Because the principle of operation of Otsuka (modified by Frank), after further modification by Kuntman, would be changed, a *prima facie* case of obviousness cannot be established under the above-described scenario wherein Otsuka (modified by Frank) is modified by Kuntman.

Here, Kuntman suggests (1) operating wind shear detection during the landing and take off phases of flight, <u>and</u> (2) operating weather radar in its "normal modes" during cruise, climb

and approach phases of flight. Accordingly, Kuntman suggests operating different modes of the radar during different phases of flight.

However, Kuntman fails to disclose or suggest generating a warning as a function of said forecast information describing a weather condition and said phase of flight. Rather, Kuntman teaches that an alert could be "generated any time a severe wind shear probability is detected." Column 4, lines 27-29. Thus, Kuntman does NOT tie generating an alert to phase of flight. Rather, Kuntman only ties generating an alert to if the wind shear detection mode of the radar is being operated. Kuntman teaches generating an alert (1) if the wind shear detection mode of the radar is being operated, and (2) if the threat is a "severe wind shear probability." Phase of flight is not even relevant to generating an alert as taught by Kuntman.

Kuntman only teaches that a best practice is to operate the wind shear mode during critical phase of flight. It is not operating as a function of phase of flight merely to choose to operate the radar in a different mode during different phases of flight, as taught by Kuntman.

As taught by Kuntman, if the wind shear mode is operating, an alert is generated; if it is not operating, the alert is not generated. Thus, Kuntman only teaches generating an alert as a function of turning the wind shear mode ON or OFF, not as a function of phase of flight, as recited in the claims.

Furthermore, Kuntman teaches that wind shear detection and weather detection are different and mutually exclusive operations of the weather radar. (See, *e.g.*, Column 2, line 30 to Column 4, line 26.)

Thus, as taught by Kuntman, only wind shear is operated during critical phases of flight. Weather detection is not even operated during critical phases of flight. As taught by Kuntman, an alert is only generated as a function of wind shear detection, and Kuntman fails to disclose or suggest generating any warning as a function of said forecast information describing a weather condition, as recited in the claims.

In the Advisory Action dated September 2, 2005, the Examiner disagreed and stated that "in the system of Kuntman, the wind shear detection mode is apparently only available when the weather detection mode is not active, but the Examiner does not consider this to suggest that in all conceivable systems, the action of weather detection could never be employed simultaneously with wind shear detection (and/or phase of flight information), but rather that this is simply not the case with respect to Kuntman 's specific system. The Examiner therefore assumes that the

Applicant can only be arguing that Kuntman teaches away from combination with Frank, with respect to actual systems."

However, the "actual system" is the teaching of Kuntman. Kuntman did not teach "what might have been" as the Examiner appears to believe. Kuntman did not teach "all conceivable systems" as the Examiner would like to believe. No, Kuntman taught one system having mutually exclusive operation of the wind shear and weather detection modes.

Furthermore, Kuntman had good reasons for teaching mutually exclusive operation of the wind shear and weather detection modes.

Kuntman taught a system intended to be integrated with "known airborne weather radar systems used by the commercial and general aviation type aircraft." (Column 1, lines 11-13.) Kuntman elected to integrate the wind shear detection with the "known airborne weather radar systems" because "most of the wind shear detection weather radar system's components are similar to typical airborne weather radar systems with turbulence detection capability" and require only "modifications of these standard components as well as a Doppler signal processor and a wind shear threshold processor." (Column 1, lines 39-46.) "FIG. 2 illustrates a block diagram of a wind shear detection weather radar in accordance with a preferred embodiment of the present invention wherein wind shear detection capabilities are incorporated into an existing weather radar with turbulence detection capability." (Column 2, lines 7-17.)

As discussed by Kuntman, wind shear detection can be incorporated as a mode of operation of the weather radar. But, the two functions of wind shear detection and normal weather detection modes, are mutually exclusive: "Wind shear detection can be incorporated as a mode of operation of the weather radar and therefore could be activated during the landing and takeoff phases of flight. During the cruise, climb and approach phases of flight the radar could be operated in any of its normal modes currently available." (Column 2, lines 7-17.) Also, wind shear detection and normal weather detection modes place different elevation tilt angle and azimuth sweep angle requirements on the radar, as well as different pulse widths of the transmitted signal, and different reflectivity detection capabilities. (See, *e.g.*, Column 2, line 30 to Column 3, line 18.)

Additionally, Kuntman taught that wind shear detection is paramount during take off and landing because "wind shear can cause considerable loss of altitude at critical phases of flight."

(Column 1, lines 29-32.) Kuntman also teaches that wind shear "can cause considerable loss of altitude at critical phases of flight." (Column 2, lines 5-6.)

Frank teaches that weather detection is important during cruising to provide "the most economical flight path to a destination." Column 1, lines. 5-20. The weather detection allows the pilot to avoid turbulence caused by different weather conditions in the path of the aircraft. (See, generally, Column 1, line 21 to Column 4, line 2.)

Thus, it is logical that Kuntman teaches mutually exclusive operation of the wind shear and weather detection modes.

Furthermore, the court of *In re Gordon* found that, if proposed modification would render the prior art invention being modified unsatisfactory far its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the tap of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a petcock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were *prima facie* obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.)

Here, similar to the liquid strainer in *In re Gordon*, the weather radar of Kuntman is clearly intended for the purpose of either exclusively forecasting weather information or exclusively detecting wind shear since Kuntman teaches that "wind shear detection can be incorporated as a mode of operation of the weather radar and therefore could be activated during the landing and takeoff phases of flight. During the cruise, climb and approach phases of flight the radar could be operated in any of its normal modes currently available." (Column 2, lines 7-17.) Substituting the operations of the weather forecasting and wind shear detecting each exclusive of the other as taught by Kuntman would make the weather forecasting of

Otsuka, et al., useless during critical phases of flight when the wind shear detecting is operating exclusive of the weather detection operation. Such inoperability in a weather forecasting device clearly intended to provide weather forecasting would obviously render the weather forecasting device of Otsuka inoperable for its intended purpose because the weather information would be disabled for weather forecasting.

Similarly, inoperability in a weather forecasting device clearly intended to provide maximum useful forward weather information would certainly render the performance management computer of Frank inoperable for its intended purpose because the weather information would be unavailable for determining the position remote from the aircraft where the remote wind signal is less than the local wind signal so that an altitude can be achieved that has less headwind and is therefore more economically efficient, as required by Frank.

4) Rejection of dependent claims under 35 U.S.C. § 103

a) Claim 3

Additionally, dependent Claim 3 is allowable as reciting forecasting an intensity of a storm cell sufficient to threaten safety of flight, and as modifying the element of comparing said forecast information describing a weather condition and said phase of flight as further generating a warning as a function of a predicted intersection with said storm cell threatening said safety of flight. Appellant believes Otsuka, et al., Frank and Kuntman all fail to disclose or suggest any generating a warning as a function of a predicted intersection with said storm cell threatening said safety of flight, as recited in Claim 3.

Kuntman's activating the wind shear detection during one phase of flight and de-activating it during a different phase of flight does not disclose or suggest forecasting that an intensity of a storm cell is sufficient to threaten safety of flight and generating a warning as a function of comparing a storm cell threatening to the safety of flight and the phase of flight, as recited in Claim 3. The present invention grades threats based upon the intensity of the storm cell in combination with the phase of flight during a predicted intersection with the storm cell, and generates warnings as a function of whether the intensity of the storm cell will cause a threat to the safety of flight during the current phase of flight at the intersection. For the above reason, Claim 3 is believed to be allowable.

b) Claim 7

The Examiner does not address the fact that dependent claim 7 clearly requires "comparing said intensity of said weather condition **with** said intended phase of flight at said coincidence." For the above reason, Claim 7 is believed to be allowable.

c) Claim 11

Additionally, dependent Claim 11 is allowable independently of base Claim 1 and intervening dependent Claim 3 as reciting the generating a warning upon determining a threat to the safety of flight as a function of an intended phase of flight of the aircraft at said predicted intersection with said storm cell. Otsuka, et al., Frank and Kuntman all fail to disclose or suggest any generating a warning as a function of determining a threat to the safety of flight as a function of said forecasted intensity of said storm cell in combination with an intended phase of flight of the aircraft at said predicted intersection with said storm cell, as presently recited in Claim 11. The Examiner has failed to point to any disclosure or suggestion in Frank as anything more than knowing which phase of flight is current. The Examiner only shows that Frank discloses an onboard control display unit that includes lights, and keys for displaying data and inserting commands related to different phases of flight, using the term "modes." For support, the Examiner cites Frank at column 8, lines 38-59, which reads as follows:

> Still yet another object of the present invention is to provide a onboard aircraft flight path optimization system wherein the onboard control display unit further includes an onboard climb light, an onboard cruise light, and an onboard descent light to *indicate* flight mode of the onboard performance management system computer. (Column 8, lines 38-43, emphasis added.)
>
> Yet still another object of the present invention is to provide an onboard aircraft flight path optimization system wherein the onboard control display unit further includes an onboard climb key to display climb data and permit insertion of climb commands. (Column 8, lines 44-48.)
>
> Still yet another object of the present invention is to provide an onboard aircraft flight path optimization system wherein the onboard control display unit further includes an onboard cruise key to display cruise data and permit insertion of cruise speed commands. (Column 8, lines 49-54.)
>
> Yet still another object of the present invention is to provide an onboard aircraft flight path optimization system wherein the onboard control display unit further includes

> an onboard descent key to display descent data and permit insertion of decent rates and speeds. (Column 8, lines 55-59.)

Thus, Frank actually discloses only "an onboard descent light to indicate flight mode of the onboard performance management system computer." (Column 8, lines 38-43 above.)

Furthermore, Frank discloses the onboard descent (DES) light 56 that indicates the flight mode of the onboard performance management system computer 26 which reads as follows:

> An onboard climb (CLB) light 52, an onboard cruise (CRZ) light 54, and an onboard descent (DES) light 56 **indicate** the flight mode of the onboard performance management system computer 26. (Column 13, lines 57-60, emphasis added.)

Frank discloses the onboard descent (DES) light 56 that *only* indicates the flight mode of the onboard performance management system computer 26. Frank does not disclose or suggest doing anything *as a function* of phase of flight. Rather, Frank teaches only *indicating* the flight mode of the onboard performance management system computer 26. (Column 8, lines 38-43, and Column 13, lines 57-60.)

Frank does not even make clear whether the "flight mode" indicated by light 56 is a flight mode of the aircraft, or rather, an operational mode of the computer 26, as Frank states.

Other portions of Frank cited by the Examiner also fail to provide these deficiencies. The Examiner cites that Frank teaches "an onboard climb key to display climb data and permit insertion of climb commands." (Column 8, lines 44-48.)

The Examiner cites that Frank teaches "an onboard cruise key to display cruise data and permit insertion of cruise speed commands." (Column 8, lines 49-54.)

The Examiner cites that Frank teaches "an onboard descent key to display descent data and permit insertion of decent rates and speeds." (Column 8, lines 55-59.)

As shown, Frank clearly teaches only display of data and insertion of commands, *without* any reference to "mode" or phase of flight, as recited in Claim 11.

Thus, Frank does not disclose or suggest generating a warning, as a function of said forecast information describing a weather condition and said phase of flight, as recited in Claim 11.

Furthermore Frank does not disclose or suggest generating a warning upon determining a threat to the safety of flight as a function of an *"intended,"* i.e. future, phase of flight of the aircraft at said predicted intersection with said storm cell, as recited in Claim 11.

As discussed above, Kuntman only teaches generating a warning when the wind shear detection device is activated, and failing to generate a warning when the device is de-activated. Thus, Kuntman does not disclose or suggest any activity as a function of an intended or "future" phase of flight, as recited in Claim 11.

For each of the above reasons, Claim 11 is believed to be allowable independently of base Claim 1 and intervening dependent Claim 3.

d) Claim 17

Claim 17 differs in scope from allowable dependent Claim 11. However, the above arguments directed to allowable Claim 11 are sufficiently applicable to Claim 17 as to make repetition unnecessary. Thus, for each of the reasons above, Claim 17 is believed to be additionally allowable independently of base Claim 13 as reciting retrieving an *"intended"* or future, phase of flight of the aircraft at said coincidence of said flight path and said weather condition; and determining a potential threat to the safety of flight, as a function of said future state of said weather condition and said intended or future phase of flight.

As discussed above in connection with allowable Claim 11, Frank only discloses the onboard descent (DES) light 56 that only **indicates** the flight mode of the onboard performance management system computer 26. (Column 13, lines 57-60, reprinted above.) As also discussed above, Kuntman only teaches generating a warning as a function of whether the wind shear detection device is activated or de-activated. Thus, Kuntman does not disclose or suggest any activity as a function of an intended phase of flight, as recited in Claim 17.

For at least the above reasons, Claim 17 is allowable independently of allowable base Claim 13.

e) Claim 27

Claim 27 differs in scope from allowable dependent Claims 11 and 17. However, the above arguments directed to allowable Claims 11 and 17 are sufficiently applicable to Claim 27 as to make repetition unnecessary. Thus, for each of the reasons above, Claim 27 is believed to be additionally allowable independently of base Claim 22 and intervening Claims 25-26 as reciting an electronic circuit having a processor that is further coupled to receive from a flight management computer a signal representative of the aircraft's intended or future phase of flight

at or about coincidence with a weather condition, and the processor generating a warning signal as a function of the intended phase of flight.

As discussed above in connection with allowable Claims 11 and 17, Frank only discloses the onboard descent (DES) light 56 that only **indicates** the flight mode of the onboard performance management system computer 26. (Column 13, lines 57-60, reprinted above.) As also discussed above, Kuntman only teaches generating a warning as a function of whether the wind shear detection device is activated or de-activated. Thus, Kuntman does not disclose or suggest any activity as a function of an intended or future phase of flight, as recited in Claim 27.

For at least the above reasons, Claim 27 is allowable independently of allowable base Claim 22 and intervening Claims 25-26.

f) Claim 32

Claim 32 differs in scope from allowable dependent Claims 11, 17 and 27. However, the above arguments directed to allowable Claims 11, 17 and 27 are sufficiently applicable to Claim 32 as to make repetition unnecessary. Thus, for each of the reasons above, Claim 32 is believed to be additionally allowable independently of base Claim 29 and intervening Claims 30-31 as reciting an electronic circuit having a processor operating a threat prediction function that is further coupled to receive a signal representative of the aircraft's intended or future phase of flight, and the threat prediction function being adapted to predict a threat to the safety of flight at coincidence with said weather cells as a function of said predicted future intensity of said weather cells and said intended phase of flight at said coincidence.

As discussed above in connection with allowable Claims 11, 17 and 27, Frank only discloses the onboard descent (DES) light 56 that only **indicates** the flight mode of the onboard performance management system computer 26. (Column 13, lines 57-60, reprinted above.) As also discussed above, Kuntman only teaches generating a warning as a function of whether the wind shear detection device is activated or de-activated. Thus, Kuntman does not disclose or suggest any activity as a function of an intended or future phase of flight, as recited in Claim 32.

For at least the above reasons, Claim 32 is allowable independently of allowable base Claim 29 and intervening Claims 30-31.

g) Claim 35

Claim 35 is believed to be allowable independently of allowable base Claim 29 and intervening Claim 34 as reciting the weather radar processor being further adapted (1) to determine two or more gradations of threat, and (2) to generate said warning signal *as a function of* the two or more *gradations* of threat. Claim 35 thus recites generating a warning as a function of different levels of threat posed by the *combination* of the phase of flight of the aircraft and the future weather information.

As discussed above, Kuntman fails to disclose or suggest generating a wind shear warning *as a function of* phase of flight of the aircraft.

As taught by Kuntman, "newer airborne weather radar systems have the additional capability of performing Doppler signal processing for detecting turbulence. These radar systems compare spectral bandwidth of the return signals against a threshold. *If the threshold is exceeded*, then it is assumed that the scanned area contains turbulent conditions." (Column 1, lines 17-23, emphasis added.)

The wind shear detection weather radar of Kuntman includes modifications of these standard components, as well as a Doppler signal processor and a wind shear threshold processor. (Column 1, lines 35-46, emphasis added.)

Kuntman teaches that radar Doppler information is generated by a Doppler signal processor 34, and provided to a wind shear threshold processor 36. See, generally, Column 3, line 19 to Column 4, line 5. The wind shear threshold processor 36 calculates differences between the maximum and minimum wind velocities. "These figures are compared against thresholds for wind shear." (Column 4, lines 13-17.) The wind shear probabilities can be divided into mild, moderate and severe wind shear probabilities. (Column 4, lines 17-20.)

However, as taught by Kuntman, a display/alert 32 is generated any time a severe wind shear probability is detected. (Column 4, lines 27-29.) Thus, Kuntman fails to disclose or suggest generating a warning signal *as a function of* the two or more *gradations* of threat, as recited in Claim 35.

Furthermore, Kuntman clearly teaches determining grades of threat as a function only of the "wind shear probabilities." Thus, as discussed above, Kuntman fails to disclose or suggest consideration of phase of flight. Therefore, Kuntman cannot disclose or suggest determining gradations of threat as a function of phase of flight, as recited in Claim 35.

Rather, as discussed above, the wind shear detection function of Kuntman is either activated or de-activated. Once activated, the wind shear detection function only determines level of threat as a function of intensity of wind shear, not phase of flight. For example, Kuntman teaches comparing differences between the maximum and minimum wind velocities against thresholds for wind shear. (Column 4, lines 13-17.) In a preferred embodiment, values of 10, 20 and 30 knots are used for typical thresholds indicating mild, moderate and severe wind shear probabilities. Thus, it is the difference between the maximum and minimum wind velocities that Kuntman uses to determine whether to annunciate the display/alert 32, <u>not</u> the phase of flight, as recited in the claims of the present invention.

Thus, for at least the reasons above, Claim 35 is believed to be allowable independently of allowable base Claim 29 and intervening Claim 34.

5) Reply made to the Examiner's Answer to the initial Appeal Brief

The Examiner issued an Examiner's Answer, mailed February 26, 2007, to the Applicant's initial Appeal Brief, since vacated by decision of the Board. The Appellant's substantive response to the vacated Examiner's Answer is repeated hereinbelow for completeness of this Supplemental Appeal Brief.

In the Examiner's Answer, the Examiner states "the Examiner relies on Kuntman to teach what he maintains in and of itself would have been known to one of ordinary skill in the art at the time of invention, namely that wind shear is path dependent and that wind shear has a different level of significance depending on the phase of flight of the aircraft" (Examiner's Answer, page 8). The Examiner also states "... the Examiner relies on Kuntman to teach what was known to one of ordinary skill in the art regarding wind shear paths and phase of flight" (Examiner's Answer, page 8). The Examiner further states "Kuntman discloses that wind shear when detected leads to an alert provided by the detection device. Kuntman also discloses that this is important for critical phases of flight, yet not important enough for non-critical phases of flight that the wind shear detection mode is not even activated. The Examiner therefore believes that since an alert is generated only when wind shear is detected and only when the device is in wind shear detection mode, and since the device is only in detection mode during critical phases of flight, the Examiner believes that "generating a warning as a function of the phase of flight" is disclosed in the Kuntman reference" (Examiner's Answer, page 9).

Appellant believes that even if Kuntman teaches all that the Examiner asserts, Kuntman's teachings still do not supply the missing limitations of Otsuka and Frank (Appellant additionally points out that "generating a warning as a function of the phase of flight" is not a limitation contained in the claims). In fact, according to the Examiner and Kuntman, Kuntman teaches away from the present invention in a different way than previously pointed out by the Appellant.

As the Examiner notes and Kuntman states, "Kuntman discloses that wind shear when detected leads to an alert provided by the detection device. Kuntman also discloses that this is important for critical phases of flight, yet not important enough for non-critical phases of flight that the wind shear detection mode is not even activated" (Examiner's Answer, page 9). Thus, Kuntman teaches away from wind shear detection during non-critical phases of flight. In contrast, Appellant teaches wind shear detection during non-critical phases of flight. Also, Appellant teaches that "according to another aspect of the invention, the weather incident prediction function of the invention communicates with the on-board flight management system to access the aircraft's intended flight path stored therein and compare it to predicted future position of the storm cell. If the predicted storm cell path and the aircraft's intended flight path coincide, and if conditions, such as phase of flight and storm cell intensity, could threaten the safety of flight, an appropriate warning is issued" (Summary of the Invention, paragraph 45).

Knowledge of critical and non-critical phases of flight combined with knowledge that wind shear is path dependent and that wind shear has a different level of significance depending on the phase of flight of the aircraft does not render obvious "retrieving a phase of flight of the aircraft; and generating a warning as a function of comparing said forecast information describing a weather condition and said phase of flight" (from Appellant's Claim 1). There is no teaching, suggestion, or motivation in Kuntman (or Otsuka or Frank) to retrieve a phase of flight. The fact that Kuntman's device is turned on only during critical phases of flight does not render obvious "retrieving a phase of flight."

Two possible scenarios for an aircraft illustrate the point. First, an aircraft in a non-critical phase of flight that detects a wind shear condition that the craft will coincide with during a non-critical phase of flight. Appellant's invention would detect the wind shear condition and compare it to a phase of flight in which the craft is projected to be when the craft coincides with the condition, and generate a warning based on the comparison. Kuntman's invention would be off, and thus would not function. If Kuntman's invention were on, there would be no retrieval of

flight phase, and Kuntman's invention would generate a warning regardless of the phase of flight the aircraft would be in when the craft coincided with the condition.

Second, an aircraft in a non-critical phase of flight that detects a wind shear condition the plane will coincide with during a critical phase of flight. Appellant's invention would detect the condition and issue a warning. Kuntman's invention would not be on, and so would not function to generate a warning. Kuntman's invention would be turned on at the start of a critical phase of flight, and thus would generate a warning, but at a much later time than Applicant's invention. If Kuntman's invention was turned on, Kuntman would generate a warning, not because Kuntman retrieved a phase of flight, but because Kuntman assumes that all phases are critical if Kuntman's device is on.

At best, the combination of Otsuka and Frank with Kuntman would operate to generate inappropriate warnings, since any time a wind shear condition was detected, a warning would be issued, because Kuntman assumes that it is in a critical phase of flight. Kuntman obviously cannot contain a teaching, suggestion, or motivation to retrieve a phase of flight, because Kuntman's device is only turned on during critical phases of flight, and thus Kuntman's decision to issue a warning is based on the assumption that the phase of flight is critical.

The Claims 1 and 3-38 being in form for allowance, reconsideration and allowance is respectfully requested.

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VIII. CLAIMS APPENDIX

Claim 1: A method for predicting the future state of a weather condition relative to an aircraft, the method comprising:

accessing a first weather radar image generated relative to the aircraft;

accessing a second weather radar image generated after said first weather radar image and having a similar relationship to the aircraft as said first weather radar image;

mapping said first weather radar image onto said second weather radar image;

comparing said first and second weather radar images;

forecasting information describing a weather condition represented by said first and second weather radar images;

retrieving a phase of flight of the aircraft; and

generating a warning as a function of comparing said forecast information describing a weather condition and said phase of flight.

Claim 2: (Canceled)

Claim 3: The method recited in claim 1, wherein said forecasting information describing a weather condition represented by said first and second weather radar images further comprises forecasting an intensity of a storm cell sufficient to threaten safety of flight; and

said comparing said forecast information describing a weather condition and said phase of flight further comprises generating a warning as a function of a predicted intersection with said storm cell threatening said safety of flight.

Claim 4: The method recited in claim 1, wherein said generating a warning as a function of said forecast information describing a weather condition and said phase of flight further comprises determining a coincidence of the aircraft and said weather condition.

Claim 5: The method recited in claim 4, wherein determining a coincidence of the aircraft and said weather condition further comprises retrieving a flight path of the aircraft and comparing said flight path with a location of said weather condition.

Claim 6: The method recited in claim 5, wherein said retrieving a phase of flight of the aircraft further comprises retrieving an intended phase of flight at said coincidence of the aircraft and said weather condition; and

said generating a warning as a function of said forecast information describing a weather condition and said phase of flight further comprises generating a warning as a function of said forecast information describing a weather condition and said intended phase of flight at said coincidence.

Claim 7: The method recited in claim 6, wherein said generating a warning further comprises generating a warning as a function of determining an intensity of said weather condition at said coincidence; and

comparing said intensity of said weather condition with said intended phase of flight at said coincidence

Claim 8: The method recited in claim 1, wherein said forecast information further comprises information describing a track of said weather condition.

Claim 9: The method recited in claim 8, further comprising:

accessing a flight path of the aircraft;

comparing said forecast track of said weather condition with said flight path; and predicting a coincidence of said flight path and said weather condition.

Claim 10 (original): The method recited in claim 9, further comprising generating an alert as a function of said coincidence of said flight path and said weather condition.

Claim 11: The method recited in claim 3, wherein said comparing said forecast information describing a weather condition and said phase of flight further comprises determining a threat to the safety of flight as a function of said forecasted intensity of said storm cell storm cell as a function of an intended phase of flight of the aircraft at said predicted intersection with said storm cell.

Claim 12: The method recited in claim 8, wherein:

said forecasting information describing a weather condition further comprises forecasting a weather radar image representative of said weather condition relative to the aircraft; and

said displaying information describing said forecast track of said weather condition further comprises displaying said forecast weather radar image.

Claim 13: A method for predicting the future position and intensity of a weather condition relative to an aircraft using a weather radar resident on-board the aircraft, the method comprising:

recording a first weather radar image generated by an onboard weather radar;

recording a second weather radar image generated after said first weather radar image;

spatially and temporally mapping said first weather radar image onto said second weather radar image;

predicting a future track of a weather condition as a function of said first and second weather radar images;

displaying said predicted future track of said weather condition;

retrieving a phase of flight of the aircraft; and

determining a potential threat to the safety of flight and a severity of said potential threat as a function of comparing said weather condition and said phase of flight.

Claim 14: The method recited in claim 13, further comprising:

retrieving a stored flight path of the aircraft;

comparing said flight path with said predicted future track of said weather condition; and

determining a coincidence of said flight path and said weather condition.

Claim 15: The method recited in claim 14, further comprising generating a warning as a function of said coincidence of said flight path and said weather condition

Claim 16: The method recited in claim 15, wherein:

each of said first and second weather radar images further comprise respective first and second images representative of said weather condition;

said comparing said first and second weather radar images further comprises comparing first and second states of said weather condition; and

forecasting a future state of said weather condition.

Claim 17: The method recited in claim 16, wherein:

said retrieving a phase of flight of the aircraft further comprises retrieving an intended phase of flight of the aircraft at said coincidence of said flight path and said weather condition; and

said determining a potential threat to the safety of flight further comprises determining a potential threat to the safety of flight as a function of said future state of said weather condition and said intended phase of flight.

Claim 18: The method recited in claim 17, wherein said generating a warning is further a function of said potential threat to the safety of flight.

Claim 19: The method recited in claim 18, wherein said displaying said predicted future track of said weather condition further comprises displaying one or more of a future position and a future intensity of said weather condition

Claim 20: A method for using an electronic circuit to predict the future position and intensity of a weather condition relative to an aircraft using a weather radar resident on-board the aircraft, the method comprising:

recording a first weather radar image generated by an onboard weather radar;

recording a second weather radar image generated at a time after said first weather radar image;

accessing said first and second recorded weather radar images;

with the electronic circuit, referencing said first and second recorded weather radar images to a common physical location;

with the electronic circuit, analyzing said first and second weather radar images;

with the electronic circuit, predicting a future track of one or more weather cells as a function of said analyzing said first and second weather radar images;

with the electronic circuit, generating a signal representative of said predicted future track of said one or more weather cells;

displaying said predicted future track of one or more of said weather cells;

with the electronic circuit, accessing an intended flight path of the aircraft;

with the electronic circuit, accessing a phase of flight of the aircraft;

with the electronic circuit, predicting a coincidence of said intended flight path and said weather condition; and

with the electronic circuit, determining a potential threat to the safety of flight as a function of comparing said coincidence of said intended flight path, said phase of flight, and said weather condition.

Claim 21: The method recited in claim 20, wherein said predicting a coincidence of said intended flight path and one or more of said weather cells further comprises with the electronic circuit, comparing said predicted future track of one or more of said weather cells with said intended flight path.

Claim 22: An electronic circuit for use with a weather radar system to predict the future state of a weather condition relative to an aircraft, the electronic circuit comprising:

a memory for storing a plurality of machine instructions;

a processor coupled to receive a signal representative of a phase of flight of the aircraft and further coupled to said memory for accessing said plurality of machine instructions, said processor accessing a phase of flight of the aircraft and executing said plurality of machine instructions to implement a plurality of functions, said functions comprising:

a) accessing a first weather radar image generated relative to the aircraft;

b) accessing a second weather radar image generated after said first weather radar image and having a similar relationship to the aircraft as said first weather radar image;

c) referencing said first weather radar image to said second weather radar image;

d) comparing said first and second weather radar images;

d) forecasting as a function of said first and second weather radar images information describing a weather condition represented by said first and second weather radar images; and

e) generating a warning as a function of comparing said phase of flight and said information describing a weather condition represented by said first and second weather radar images.

Claim 23: The electronic circuit recited in claim 22, wherein said plurality of functions further comprises generating a video signal representative of said forecast weather condition information.

Claim 24: The electronic circuit recited in claim 22, wherein:

said processor is further coupled to receive from a flight management computer a signal representative of the aircraft's intended flight path;

said forecasting information describing a weather condition further comprises forecasting a future track of said weather condition;

and said plurality of functions further comprises:

comparing said forecast track of said weather condition with said intended flight path; and

predicting a coincidence of said intended flight path and said weather condition.

Claim 25: The electronic circuit recited in claim 22, wherein said forecasting information describing a weather condition further comprises forecasting a state of said weather condition at or about said coincidence.

Claim 26: The electronic circuit recited in claim 25, wherein said generating a warning further comprises generating a warning signal as a function of said coincidence, said phase of flight, and said state of said weather condition at or about said coincidence.

Claim 27: The electronic circuit recited in claim 26, wherein:

said processor is further coupled to receive from a flight management computer a signal representative of the aircraft's intended phase of flight at or about said coincidence; and

wherein said generating a warning signal is further a function of said intended phase of flight.

Claim 28: The electronic circuit recited in claim 27, further comprising a weather radar unit coupled to said processor,

Claim 29: An electronic circuit for coupling to a weather radar system on-board an aircraft to display weather information and forecast weather data relative to a phase of flight of the aircraft, the processor comprising:

a weather radar processor adapted to receive first and second weather radar return signals from a receiver portion of a weather radar system resident on-board an aircraft and convert said first and second weather radar return signals into first and second weather radar image signals representative of weather information relative to said aircraft contained in said weather radar return signals;

a memory coupled to said processor and adapted to receive and store said first and second weather radar image signals;

a weather incident prediction function operated by said processor and coupled to said memory to receive first and second different ones of said stored weather radar image signals, said weather incident prediction function adapted to forecast future weather information relative to said aircraft as a function of said first and second stored weather radar image signals, and generate a signal representative of said future weather information; and

a threat prediction function operated by said processor and coupled to receive a signal representative of a phase of flight of the aircraft and said signal representative of said future weather information, said threat prediction function adapted to compare said future weather information and said phase of flight and predict a threat to the safety of flight as a function of said comparison.

Claim 30: The electronic circuit recited in claim 29, wherein:

said storage of said weather radar image signals is further a function of time; and

said forecast of future weather information relative to said aircraft is further a function of said time.

Claim 31: The electronic circuit recited in claim 30, wherein said future weather information further comprises information describing both a predicted future intensity and a predicted future track of one or more weather cells described by said weather information contained in said weather radar return signals.

Claim 32: The electronic circuit recited in claim 31, wherein:

said signal representative of a phase of flight of the aircraft further comprises a signal representative of an intended phase of flight of the aircraft;

said weather radar processor is further adapted to receive a signal representative of an intended flight path of said aircraft;

said weather incident prediction function is further adapted to predict a coincidence of said intended flight path and one or more of said weather cells; and

said threat prediction function is further adapted to predict said threat at said coincidence as a function of said predicted future intensity of said one or more of said weather cells and said intended phase of flight at coincidence.

Claim 33: The electronic circuit recited in claim 31, wherein:

said weather radar processor is further adapted to receive a signal representative of an intended flight plan of said aircraft; and

said weather incident prediction function is further adapted to predict a coincidence of said intended flight plan and one or more of said weather cells.

Claim 34: The electronic circuit recited in claim 29, wherein said weather radar processor is further adapted to generate a warning signal as a function of said threat prediction function.

Claim 35: The electronic circuit recited in claim 34, wherein said weather radar processor is further adapted to determine two or more gradations of threat and to generate said warning signal as a function of said two or more gradations of threat.

Claim 36: The electronic circuit recited in claim 29, further comprising a display coupled to said processor and adapted to receive each of said weather radar image signals representative of weather information contained in said weather radar return signals and said signal representative of said future weather information, said display comprising a screen adapted to display each of said weather information contained in said weather radar return signals and said future weather information.

Claim 37: The electronic circuit recited in claim 36, wherein said processor is further adapted to generate weather radar transmission signals; and further comprising:

a transmitter coupled to receive said weather radar transmission signals from said processor and output said weather radar transmission signals to a radar antenna; and

a receiver coupled to receive weather radar return signals from a radar antenna and output said received weather radar return signals to said processor.

Claim 38: The electronic circuit recited in claim 29, wherein said threat prediction function is further adapted to determine a severity of said threat to the safety of flight as a function of said comparison of said future weather information and said phase of flight.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.